DOCUMENT RESUME

ED 170 044 PS 010 544

AUTHOR Schuman, Davida R.; Relihan, Juliette L.
TITLE Effects of Training in the Use of an Organizing Strategy with Young Inner-City Children.
PUB DATE Apr 79
NOTE 20p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, California, April 8-12, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Abstract Reasoning; *Classification; *Cognitive Ability; *Disadvantaged Youth; Elementary School Students; Logic; *Logical Thinking; Low Income Groups; Mnemonics; Research; Retention Studies; Thought Processes
IDENTIFIERS *Piaget (Jean)

ABSTRACT

This study investigates the training of inner-city first and second graders in Piagetian classification skills. Twenty boys and 20 girls were pretested for necessary baseline knowledge and were randomly assigned to experimental and control groups. Both groups were given training programs intended to assist the children in developing classification skills which lead to mastery of class inclusion. The experimental condition was directed toward helping the child recode the task elements at superordinate and subordinate class levels. The control group was not helped to recall class hierarchies. Each child was trained individually on six specific classification skills (resemblance, consistent and exhaustive sorting, horizontal resorting, dual class membership and class inclusion) in 20-minute sessions on 4 consecutive days, posttested on the fifth, and given the pretest 4 to 6 weeks later as a test of retention. While both experimental and control group members improved in classification ability, experimental group members in both the first and second grades improved much more than did controls. Further, many more experimental group members maintained their higher level of performance after 4 to 6 weeks. It is concluded that teachers should analyze the tasks they require of young children and provide their students with strategies which organize the features of tasks to be performed. (Author/RH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED170044

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

EFFECTS OF TRAINING IN THE USE OF AN ORGANIZING STRATEGY WITH YOUNG INNER-CITY CHILDREN

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Davida R. Schuman

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

Davida R. Schuman, Ph.D.
Department of Communication Sciences
Kean College of New Jersey
Morris Avenue
Union, New Jersey 07083

Juliette L. Relihan, Ph.D.
Greer-Woodycrest Children's Services
Hope Farm
Millbrook, New York 12545

A.E.R.A. Conference
San Francisco, California
April, 1979

PS010544

Effects of Training in the Use of an Organizing Strategy with Young Inner-City Children

In the opening year of this decade Charles Silberman (1970) exploded onto the educational scene with his account of the American educational system. The crises documented by him became the subject of intense educational research. This research became acutely intensified in the area of urban education.

Educators, aware of their failure to help inner-city black children achieve at levels commensurate with middle-class children, sought to discover the cause of this lag. Deutsch (1972) and Gordon (1972) state that although the inner-city black child is competent, appropriate learning settings and stimulating experiences must be developed in order to permit him to demonstrate his abilities. They emphasize the need for implementing new and different instructional approaches to teach the inner-city black child.

With the advent of Head Start and similar programs, children have begun to come to school at an earlier age than ever before in history. In order to develop new and different instructional approaches, there has to be an understanding of the young child's information processing capabilities. In the past, educators and psychologists have contended that the child's capacity for processing information is dependent upon maturation. As a result, instruction which was often necessary for

efficient everyday functioning, was frequently postponed until the child was "ready" (Relihan & Restaino, Note 1).

Miller (1956) set the standard for how much unlearned information can be processed by an individual through his study of the number of information chunks that can be stored in short-term memory. McLaughlin (1963) describes the information processing capacity of a young child in terms of memory span which increases as he grows older. Pascual-Leone (1970) proposes that the information processing system be described in terms of a central computing space called "M." It is the M operator which defines the central computing space available for the transformation and coordination of information. Pascual-Leone details a parallel between this M operator and the structural limits of short-term memory as defined by Miller. Farnham-Diggory (1972) also concurs that the chief limitation on the child's ability to process information is his limited memory span. The limitations placed on short-term memory processing causes attention to focus on how to help children use their available M space or memory span most effectively.

Recent research in memory processes indicates that the young child's difficulties with short-term memory is probably the result of inefficient organization rather than that of a maturational lag. Hagen, Jongeward, Jr., and Kail, Jr. (1975) conclude that "changes in memory between the ages 5 through 11 are a consequence of the child's . . . sophisticated mnemonic strategies" (p. 96). Belmont and Butterfield (1971), Farnham-Diggory (1972), Flavell (1970), and Haith (1971) all support the theory that the young child lacks only the

knowledge of an efficient means to organize his information for processing. Brown (1975) concludes that the selection of organizing strategies familiar to the young child promotes their efficient use. Trabasso, Isen, Dolecki, McLanahan, Riley, and Tucker (1978) also found the use of familiar strategies to be more conducive to success in young children.

The mastery of classification operations is considered to be essential in order for the child to learn the hierarchical concepts found in mathematics, reading, social studies, and science. Without these logical operations, the child is severely handicapped in school (Relihan & Restaino, Note 1). However, close scrutiny of past Piagetian research reveals little success in training the young child to master these logical operations (Ahr & Youniss, 1970; Kohnstamm, 1963; Sheppard, 1973).

Current research in information processing lends support to the theory that failure to train young children in logical operations may be accounted for by the failure to analyze the information processing demands in such operations. Klahr (Note 2), Klahr and Wallace (1976), Pascual-Leone (1970), and Scardamalia (1977) all stress the importance of task analysis of logical operations.

If logical operations are dependent upon short-term memory processing, and if the use of familiar organizing strategies can increase the efficiency of short-term memory, there is reason to expect that given such strategies, young children may be able to master some logical operations.

The focus of the present study was to explore the viability of training inner-city children in Piagetian classification skills, using

the curriculum previously developed for use with middle-class rural children (Relihan, 1976). The curriculum was designed to provide children with an organizing strategy to increase the efficient functioning of their short-term memory. The organizing strategy selected to facilitate the development of classification skills, namely "families" and "superfamilies," was a particularly familiar and salient concept for both groups of children.

Method

Subjects

The sample was composed of a randomized selection of boys and girls in the first and second grade classes of a parochial school in New York City. The population of the school was representative of children within a low income community. All first and second grade children were first screened using the Relihan Screening Test (1976) to determine their familiarity with the objects and words used in the training and testing. Those children who were successful were then given the pretest form of the classification test. All tests were reproduced from the study completed by Relihan (1976). Baseline performance was set at successful completion of the first three tasks (resemblance, consistent, and exhaustive sorting) of the six-task series. These three tasks were selected for baseline because they explain the boundaries and contents of isolated classes, knowledge of which is considered essential for the study. From the group who successfully completed the baseline tasks, 20 boys and 20 girls in both first and second grades were randomly assigned to the experimental and control

groups. A restricted random sampling technique was employed to insure that the distributions according to age for both experimental and control groups did not deviate seriously from one another.

In the total population consisting of 40 children, the mean age for the first grade control group was six-years six-months, with a standard deviation, 3.8 months; the mean age for the first grade experimental group was six-years six-months, with a standard deviation, 3.5 months. The mean age for the second grade control group was seven-years six-months, with a standard deviation, 3.3. months; the mean age for the second grade experimental group was seven-years six-months, with a standard deviation, 3.1 months.

Materials

The Relihan Screening Test was employed to determine the child's familiarity with the objects to be used in the experimental and control training programs. A classification test based upon Kofsky's "Scalogram Analysis of Classificatory Behavior" (1963), was developed by Relihan (1976) and used in the present study. It consisted of six tasks designed to evaluate the child's level of performance on classification operations. The six tasks included resemblance sorting (two objects are grouped because they are alike in some way), consistent sorting (three or more objects are grouped together because they share a common characteristic), exhaustive sorting (all objects possessing a specific attribute are grouped together), horizontal resorting (objects can be sorted into groups using one set of attributes and then resorted using a different set of attributes), dual-class membership (an object can be

placed in two groups at the same time), and class-inclusion (a superordinate class includes more members than any single subordinate class).

Procedure

An experimental and a control training program was employed, both intended to assist the child in developing classification skills which culminated in mastery of class-inclusion. These training programs were identical to those used by Relihan (1976) in her study. Experiences were designed to provide active participation by the subject in engaging a conflict situation necessary for implementation of classification operations.

The organizing structure introduced in the experimental condition was directed toward helping the child to recode the task elements at both the superordinate and subordinate class levels, while providing the opportunity for interaction between the two. Throughout the experimental curriculum the mnemonics of "family" and "superfamily" were used to assist in the recoding. The term "family" was used because it is a familiar concept for the young child. Within the past several years, children have used the term "super" to mean "great" or "big." Markman (1973), and Markman and Seibert (1976) used the term "family" when asking class-inclusion questions and found that young children understood and correctly used the concept in answering the questions. The control program differed in that there was no attempt to assist the child to recall the class hierarchies through the use of a mnemonic.

In both programs training was directed at the specific classification skills, providing for both subject participation and experimenter

explanations. Each child in both experimental and control groups was trained individually in 20 minute sessions on four consecutive days. On the fifth day, the parallel form was administered as the posttest. Four to six weeks later, the form used as the pretest was administered as a retention test. All tests were reproduced from the Relihan Classification Tests (1976).

Results

The children were given a total of six tests at different levels of classification. Each child was scored as passing or failing at each test level, and the number passing at each level was tabulated for each group.

In the pretest condition, none of the children in any group was successful in passing the tasks beyond the baseline level. In the first grade control group 17% advanced beyond their pretest level while 71% of the experimental first graders advanced. Second grade control group advancement was 33%, while 67% of their experimental counterparts advanced.

After an interval of four to six weeks, a retention test was administered. On this date 13% of the first grade control group had maintained their higher level performance, while 58% of the experimental first graders were able to maintain the higher level performance. The second grade control group had a maintenance rate of 47%, while the rate for the experimental group was 86%.

Chi square analysis of the test data indicate that the observed frequencies of passing responses of the experimental and control groups

differed significantly at the .01 level of significance. The experimental group performed significantly better on the three higher level classification tasks than did the control group.

(See tables attached).

Discussion

Examination of test results indicate the effectiveness of the organizing strategy with the experimental group. Although the control groups received specific training in higher level classification skills, they did not achieve the high level of success reached by the experimental group. Training that provides explanation of the basis for individual classification skills was not sufficient enough to assist the control child in the problem solving situation.

In the experimental curriculum, task analysis resulted in the development of an organizing strategy that permitted the children to use their short-term memory resources at an optimum level. Brown (1975), Case (1975a, in press), and Greeno (1978) suggest that task analysis is a necessary requirement for the teacher to plan meaningful instruction. Without task analysis it is possible that the teacher might be totally unaware of the processing demands in any given school situation. As a result, a teacher may unknowingly present new information in such a fashion that she overloads the processing capacity of young children. Failure on the child's part, therefore, would be more the result of memory overload rather than that of incompetence.

When the child understands the strategy he is then able to attend to the other features of the task. Developing instructional strategies

can result in the reduction of the working memory requirement necessary to learn a higher level cognitive skill (Case, 1975a, 1978, in press).

The experimental group in the present study did not achieve success on the posttest and retention test commensurate with the experimental group in Relihan's (1976) study. The differences in achievement may be due to the socio-economic level of the children in the present study. Several investigators (Carlson, 1971; Case, 1975b; Gaudia, 1972; Raven, 1968; Tuddenham, 1970; Wei, Lavatelli, & Jones, 1971), have found a developmental lag in children from low socio-economic groups when performing Piagetian tasks.

If such a developmental lag does exist, then urban children may need extended practice in the use of the organizing strategy in order to sustain its effectiveness over a period of time. Task analysis of the various classification skills taught through the curricula indicates that there are considerably more units of information to be remembered in horizontal resorting, the task which the children found most difficult to solve, than in dual class membership or class-inclusion. In a current study with inner-city children, additional training in horizontal resorting is being given to both control and experimental groups. It is anticipated that the increased usage of the organizing strategy will help the young inner-city child overlearn the components of the horizontal resorting tasks and enable him to maintain performance at it for the future.

The successful teaching of young inner-city children is a challenge that must be met by those interested in their education. Attention must be focused upon the role of memory in early learning.

Whenver possible teachers must provide facilitative organizational strategies to compensate for limited processing systems. Curriculum specialists and teachers need to be cognizant of the young child's working memory capacity and design instruction that will not exceed his ability to process unlearned material (Biggs, 1968; Rohwer & Dempster, 1977). The present study gives strong support to the necessity for analyzing the tasks required of the young child. The data demonstrate that with the appropriate examination and control of task component demands, young inner-city children may be able to function with higher level logical operations at an age earlier than expected.

Reference Notes

1. Reilhan, J., & Restaino, L. C. R. Effects of training in organizing upon the solving of class-inclusion problems in young children. Paper presented as part of critique panel: Research Related to Piagetian Theory and Tasks. A.E.R.A. Conference, San Francisco, California, April 1976.

2. Klahr, D. Discussion: Research related to Piagetian theory and tasks. Critique presented as part of panel: Research Related to Piagetian Theory and Tasks. A.E.R.A. Conference, San Francisco, California, April 1976.

References

Ahr, P. R., & Youniss, J. Reasons for failure on the class-inclusion problem. Child Development, 1970, 41, 131-143.

Belmont, J. M., & Butterfield, E. C. What the development of short-term memory is. Human Development, 1971, 14, 236-238.

Briggs, J. B. Information and human learning. North Melbourne, Victoria: Cassell Australia, Ltd., 1968.

Brown, A. L. The development of memory: Knowing, knowing about knowing, and knowing how to know. In W. Reese (Ed.), Advances in child development and behavior (Vol. 10). New York: Academic Press, 1975.

Carlson, J. S. Some relationships between class inclusion, perceptual capabilities, verbal capabilities, and race. Human Development, 1971, 4, 30-38.

Case, R. Gearing the demands of instruction to the developmental capacities of the learner. Review of Educational Research, 1975, 45, 59-87. (a)

Case, R. Social-class differences in intellectual development: A neo-Piagetian investigation. Canadian Journal of Behavioral Science, 1975, 7, 244-261. (b)

Case, R. Intellectual development from birth to adulthood: A neo-Piagetian interpretation. In R. S. Siegler (Ed.), Children's thinking: What develops? Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.

Case, R. A developmentally based theory and technology of instruction. Review of Educational Research, in press.

Deutsch, M. Behavioral and environmental limits of change. In K. B. Clark et al. (Eds.), The educationally deprived: The potential for change. New York: Metropolitan Applied Research Center, Inc., 1972.

Farnham-Diggory, S. The development of equivalence systems. In S. Farnham-Diggory (Ed.), Information processing in children. New York: Academic Press, 1972.

Flavell, J. H. Developmental studies of mediated memory. In H. W. Reese & L. P. L sitt (Eds.), Advances in child development and behavior (Vol. 5). New York: Academic Press, 1970.

Gaudia, G. Race, social class, and age of achievement of conservation on Piaget's tasks. Developmental Psychology, 1972, 6, 158-165.

Gordon, S. Cultural deprivation theories: Responses. In K. B. Clark et al. (Eds.), The educationally deprived: The potential for change. New York: Metropolitan Applied Research Center, Inc., 1972.

Greeno, J. G. A discussion of the chapters by Siegler, Trabasso, Klahr, and Gelman. In R. S. Siegler (Ed.), Children's thinking: What develops? Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.

Haith, M. M. Developmental changes in visual information processing and short-term visual memory. Human Development, 1971, 14, 249-261.

Hagen, J. W., Jongeward, R. H., Jr., & Kail, R. V., Jr. Cognitive perspectives on the development of memory. In H. W. Reese (Ed.), Advances in child development and behavior (Vol. 10). New York: Academic Press, 1975.

Klahr, D., & Wallace, J. G. Cognitive development: An information processing view. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1976.

Kofsky, E. Developmental scalogram analysis of classificatory behavior. Unpublished doctoral dissertation, University of Rochester, 1963.

Kohnstamm, G. A. An evaluation of part of Piaget's theory. Acta Psychologica, 1963, 21, 313-356.

Markman, E. The facilitation of part-whole comparisons by use of the collective noun "family." Child Development, 1973, 44, 837-840.

Markman, E., & Seibert, J. Classes and collections: Internal organization and resulting holistic properties. Cognitive Psychology, 1976, 8, 561-577.

McLaughlin, G. H. Psychologic: A possible alternative to Piaget's formulation. British Journal of Educational Psychology, 1963, 33, 61-67.

Miller, G. The magical number seven, plus or minus two: Some limitations on our capacity for processing information. The Psychological Review, 1956, 63, 81-97.

Pascual-Leone, J. A mathematical model for the transition rule in Piaget's developmental stages. Acta Psychologica, 1970, 32, 301-345.

Raven, R. J. The development of classification abilities in culturally disadvantaged children. Journal of Research in Science Teaching, 1968, 5, 224-229.

Relihan, J. Analysis of the effects of chunking experience upon solving class-inclusion problems in young children. Unpublished doctoral dissertation, Fordham University, 1976.

Rohwer, W. D., Jr., & Dempster, F. N. Memory development and educational processes. In R. V. Kail & J. W. Hagen (Eds.), Perspectives on the development of memory and cognition. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977.

Scardamalia, M. Information processing capacity and the problems of horizontal decalage: A demonstration using combinational reasoning tasks. Child Development, 1977, 48, 28-37.

Sheppard, J. L. Conservation of part and whole in the acquisition of class inclusion. Child Development, 1973, 44, 380-383.

Silberman, C. E. Crisis in the classroom: The remaking of American education. New York: Random House, 1970.

Trabasso, T., Isen, A. M., Dolecki, P., McLanahan, A. G., Riley, C. A., & Tucker, T. How do children solve class-inclusion problems? In R. S. Siegler (Ed.), Children's thinking: What develops? Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.

Tuddenham, R. D. A "Piagetian" test of cognitive development. In W. B. Dockerell (Ed.), On intelligence. Toronto: Ontario Institute for Studies in Education, 1970.

Wei, T. T. D., Lavatelli, C. B., & Jones, R. S. Piaget's concept of classification: A comparative study of socially disadvantaged and middle-class young children. Child Development, 1971, 42, 919-927.

Table 1

Number of Children Passing

Class-Inclusion Tasks

Groups	Pretest	Posttest	Retention Test
First-grade Control (N = 8)	0	0	0
Second-grade Control (N = 12)	0	3	4
First-grade Experimental (N = 8)	0	6	7
Second-grade Experimental (N = 12)	0	8	8

Table 2

Number of First-Grade Control Children

Passing at Each Level (N = 8)

Task Level	Pretest	Posttest	Retention Test
1	8	8	8
2	8	8	8
3	8	8	8
4	0	0	0
5	0	4	3
6	0	0	0

Table 3

Number of Second-Grade Control Children

Passing at Each Level (N = 12)

Task Level	Pretest	Posttest	Retention Test
1	12	12	12
2	12	12	12
3	12	12	12
4	0	1	5
5	0	8	8
6	0	3	4

Table 4

Number of First-Grade Experimental Children

Passing at Each Level (N = 8)

Task Level	Pretest	Posttest	Retention Test
1	8	8	8
2	8	8	8
3	8	8	8
4	0	4	3
5	0	7	4
6	0	6	7

Table 5

Number of Second-Grade Experimental Children Passing at Each Level (N = 12)

Task Level	Pretest	Posttest	Retention Test
1	12	12	12
2	12	12	12
3	12	12	12
4	0	7	11
5	0	9	12
6	0	8	8